WHAT IS CLAIMED IS:

1. A process for the aerobic treatment in a biosolids treatment reactor of a biosolids solution comprising the products of waste water treatment and thermophilic bacteria capable of digesting mesophilic bacteria, said process comprising:

(a) mixing a portion of the biosolids solution with an oxygen-containing gas stream using a jet aeration device;

(b) injecting a mixture of the oxygen-containing gas and biosolids solution into the reactor at a flow rate which introduces sufficient oxygen into the biosolids solution so that the treatment environment is substantially constantly aerobic; and

(c) monitoring at least one physical property of the biosolids solution;

(d) adjusting at least one physical property of the biosolids solution by adjusting the mixing of biosolids solution with the oxygen-containing gas stream.

2. The process of claim 1, wherein the step of monitoring at least one physical property comprises monitoring the temperature of the biosolids solution.

3. The process of claim 1, wherein the step of monitoring at least one physical property comprises monitoring the oxidation/reduction potential of the biosolids solution.

4. The process of claim 1, wherein the step of adjusting the mixing of biosolids solution with the oxygen-containing gas stream comprises adjusting the

amount of oxygen provided through the jet aeration device.

5. The process of claim 4, wherein the step of adjusting the amount of oxygen provided through the jet aeration device comprises adjusting the speed of at least one air blower that forces an oxygen-containing gas through the jet aeration device.

6. The process of claim 1, wherein the step of adjusting the mixing of biosolids solution with the oxygen-containing gas stream comprises adjusting the amount of shear generated by the jet aeration device.

7. The process of claim 1, further comprising the step of thickening the biosolids solution before it first enters the biosolids treatment reactor to a concentration of from about 3% to about 6% solids.

8. The process of claim 1, further comprising the step of dewatering a portion of treated biosolids wherein the dewatering step is performed in the same apparatus in which the thickening step is also performed.

9. The process of claim 1, further comprising the step of maintaining a foam layer having a depth of from about four feet to about eight feet on top of the biosolids solution in the reactor.

10. The process of claim 3, wherein the oxidation/reduction potential of the biosolids solution is controlled by adjusting the flow rate of oxygen-containing gas through the jet aeration device while keeping the liquid flow rate of biosolids through the jet aeration device substantially constant.

11. The process of claim 3, wherein the oxidation/reduction potential of the biosolids solution is controlled by adjusting the liquid flow rate of

biosolids through the jet aeration device and adjusting the flow rate of oxygen-containing gas through the jet aeration device.

12. An apparatus for autothermal aerobic treatment of waste water treatment biosolids comprising:

a reactor having an inlet for the introduction of at least one biosolids;

a jet aeration device affixed to the reactor, said device comprising:

an air header having one or more openings through which a oxygen-containing gas transported through the air header may exit the air header;

a liquid header running parallel to and/or concentric with the air header and having one or more openings through which a biosolids solution transported through the liquid header may exit the liquid header;

an outer nozzle extending from the liquid header and having an opening on its side;

an inner nozzle from the liquid header and contained extending within the outer nozzle;

one or more air passage connection from the air header to the outer nozzle which connects the air header to the liquid header and provides a closed path for air from the air header to travel to the outer nozzle and enter the outer nozzle through its side opening; and liquid from the liquid header are mixed in the outer nozzle;

an air distribution pipe connected to the air header, which provides an oxygen-containing gas from outside the reactor;

at least one aeration blower connected to the air distribution pipe such that said aeration blower forces

the oxygen-containing gas through the air distribution pipe and into the air header;

a liquid outlet located at or near the bottom of the reactor, which allows biosolids solution to exit the reactor;

at least one motive pump connected to the liquid outlet such that biosolids solution is withdrawn from the reactor by the motive pump;

a motive pump conduit leading from the motive pump to the liquid header such that biosolids solution is pumped through the conduit into the liquid header and forced through the inner nozzle by force of the motive pump;

means for sensing a physical property of the solution within the reactor; and

means for automatically controlling the physical property, said automatic control means being operatively attached to the means for sensing and the jet aeration device such that based on the physical property of the biosolids solution in the reactor as measured by the means for sensing, the automatic control means will adjust the mixture of biosolids solution and oxygen containing gas through the jet aeration device in order to adjust the physical property of the biosolids solution in the reactor.

13. The apparatus of claim 12, wherein the physical property is selected from the group consisting of temperature and oxidation/reduction potential.

14. The apparatus of claim 12, wherein the automatic control means is operatively attached to the means for sensing and at least one aeration blower such that based on the physical property of the biosolids

solution in the reactor as measured by the means for sensing, the automatic control means will adjust the aeration blower in order to adjust the amount of oxygen-containing gas provided to the biosolids solution in the reactor.

15. The apparatus of claim 12, further comprising a secondary cooling system, which comprises:

a cooling jet nozzle located in the reactor above the level of the jet aeration device; and

a conduit extending from the motive pump conduit to the cooling jet nozzle such that biosolids solution traveling through the conduit is routed above the foam level of the biosolids solution.

16. The apparatus of claim 12, wherein the reactor holds a biosolids solution having a depth of at least about 24 feet.

17. The apparatus of claim 12, wherein the biosolids solution is treated in a single reactor.